

# Issue Paper

## Inspection/Testing of Steel Construction

### ISSUE:

The 2012 International Building Code (IBC) Section 1705 (Required Verification and Inspection) has been significantly modified from the 2009 IBC:

- 2009 IBC Table 1704.3 *Required Verification and Inspection of Steel Construction* (which is adopted by DSA) includes structural steel welding and bolting special inspection requirements, and which has been removed from Table 1705.2.2 in the 2012 IBC.
- 2012 IBC Section 1705.2.1 (Structural Steel) states “Special inspection for structural steel shall be in accordance with the quality assurance inspection requirements of AISC 360,” which essentially means that quality assurance requirements of the IBC are as prescribed by AISC 360 steel standard (Chapter N) and AISC 341 seismic provisions (Chapter J).
- The referenced standards (AISC 360 and 341) do not use the terms “continuous” and “periodic” special inspection, but use the terms “observe”, “perform”, and “document”. DSA can not adequately correlate these terms with the current code-prescribed special inspection requirements and practice.
- The 2012 IBC definitions of “continuous” and “periodic” special inspection are not consistent with the 2010 CBC definitions for these terms, Part 1, Title 24 administrative regulations, and current standard of practice.

DSA cannot correlate the significant changes in the 2012 IBC as described above to our current 2010 CBC requirements, and that 2012 IBC and referenced steel standards must be amended in order to maintain 2010 CBC special inspection requirements and standard of practice.

Further, DSA believes that 2010 CBC code provisions for special inspections provide for public school construction that meets the seismic safety performance objectives of the Field Act.

### PROPOSAL:

- Continue the 2010 CBC (2009 IBC model code) Table 1704A.3 *Required Verification and Inspection of Steel Construction* provisions for structural steel welding, high-strength bolting, and steel decking.  
*This action would retain current code provisions that prescribe conditions for which periodic and continuous special inspection are required, consistent with current practice. The referenced standards (AISC 360 and 341) do not use these terms, and use the terms “observe”, “perform”, and “document”. DSA cannot correlate the terms used in the AISC standards with the current code-prescribed special inspection requirements and practice.*
- Prescribe sections within AISC 360 Chapter N that are not adopted, including N4. item 2, N5. Item 2, N5. Item 3, N5. Item 4, N7, and N8.  
*This action would prescribe non-adoption of quality assurance provisions contained in AISC 360 and 341, and would adopt the quality control and non-destructive testing (NDT) provisions contained in AISC 360 and 341. The quality assurance provisions are applicable to the owner-employed materials testing lab and special inspectors, while the contractor is responsible for conformance to the quality control provisions.*
- Continue the 2010 CBC (2009 IBC model code) definitions of “continuous” and “periodic” special inspection.  
*This action would retain current definitions, which DSA believes provide greater clarity and consistency with current practice.*

## **RATIONALE:**

- The new terminology contained in AISC 360 and 341 used to define quality assurance activities (i.e. observe, perform, document) is not correlated with current code-defined levels of special inspection (i.e. continuous and periodic).

These new terms are also not compatible with DSA's Part 1 administrative code provisions, nor with 2012 IBC provisions for special inspection of other structural materials such as masonry and concrete.

- DSA believes that current 2010 CBC code provisions and standard of practice for special inspections provide for public school construction that meets the seismic safety performance objectives of the Field Act. DSA cannot correlate the significant changes in the 2012 IBC as described above to our current 2010 CBC requirements and state of practice.

- The 2010 CBC definitions for continuous and periodic inspection are preferred over the definitions in the 2012 IBC.

The 2010 CBC definition for periodic special inspection prescribes "part-time or intermittent" observation of work, while the 2012 IBC does not include this clarification.

The 2010 CBC definition also prescribes that the inspector must be present in the area at the completion of work, while the 2012 IBC does not.

The 2010 CBC definition for continuous inspection prescribes "full-time" observation of work, while the 2012 IBC definition doesn't include this clarification.

**PROPOSED CODE CHANGE TEXT: (express terms)**

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**SECTION 1702A  
DEFINITIONS**

**1702A.1 Definitions.** The following terms are defined in Chapter 2. Terms defined below shall have the meanings shown herein.

**APPROVED AGENCY.**

**APPROVED FABRICATOR.**

**CERTIFICATE OF COMPLIANCE.**

**DESIGNATED SEISMIC SYSTEM.**

**FABRICATED ITEM.**

**INSPECTION CERTIFICATE.**

**INTUMESCENT FIRE-RESISTANT COATINGS.**

**MAIN WINDFORCE-RESISTING SYSTEM.**

**MASTIC FIRE-RESISTANT COATINGS.**

**PROJECT INSPECTOR.** [DSA-SS, DSA-SS/CC] The person approved to provide inspection in accordance with Title 24, Part 1, California Administrative Code, Section 4-333(b). The term "project inspector" is synonymous with "inspector of record."

**SPECIAL INSPECTION.**

**Continuous special inspection.** [DSA-SS, DSA-SS/CC] The full-time observation of work requiring special inspection by a special inspector who is present in the area where the work is being performed. (relocated from 2010 CBC, with minor edit)

**Periodic special inspection.** [DSA-SS, DSA-SS/CC] The part-time or intermittent observation of work requiring special inspection by a special inspector who is present in the area where the work has been or is being performed and at the completion of the work. (relocated from 2010 CBC with minor edit)

**2012 IBC definitions: (for comparison)**

**Continuous special inspection.** Special inspection by the *special inspector* who is present when and where the work to be inspected is being performed.

**Periodic special inspection.** Special inspection by the *special inspector* who is intermittently present where the work to be inspected has been or is being performed.

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**1705.2 Steel construction.** The special inspections for steel elements of buildings and structures shall be as required in this section.

**Exception:** Special inspection of the steel fabrication process shall not be required where the fabricator does not perform any welding, thermal cutting or heating operation of any kind as part of the fabrication process. In such cases, the fabricator shall be required to submit a detailed procedure for material control that demonstrates the fabricator's ability to maintain suitable records and procedures such that, at any time during the fabrication process, the material specification, and grade for the main stress-carrying elements are capable of being determined. Mill test reports shall be identifiable to the main stress-carrying elements when required by the approved construction documents.

**1705A.2.1 Structural steel.** Special inspections and tests of structural steel shall be in accordance with the quality assurance inspection requirements ~~of AISC 360~~ of this section.

AISC 360, Chapter N and AISC 341, Chapter J are adopted, except as noted below:

The following provisions of AISC 360, Chapter N are not adopted:

- N4., Item 2. (Quality Assurance Inspector Qualifications)
- N5., Item 2. (Quality Assurance)
- N5., Item 3. (Coordinated Inspection)
- N5., Item 4. (Inspection of Welding)
- N7 (Approved Fabricators and Erectors)
- N8 (Nonconforming Material and Workmanship)

In addition to the quality assurance inspection requirements contained in AISC 360, Section N5, Item 6 (Inspection of High Strength Bolting), the requirements of Table 1705A.2.1 of the California Building Code shall apply.

In addition to the quality assurance requirements contained in AISC 360, Section N6 (Minimum Requirements for Inspection of Composite Construction), the requirements of Table 1705A.2.1 of the California Building Code shall apply.

In addition to the quality assurance requirements contained in AISC 341, Chapter J, Section J5 (Inspection Tasks), the requirements of Section 1704A.3 and Table 1705A.2.1 of the California Building Code shall apply.

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**TABLE 1705.2.2**

**REQUIRED VERIFICATION AND INSPECTION OF STEEL CONSTRUCTION  
OTHER THAN STRUCTURAL STEEL**

*(Relocated from 2010 CBC, Section 1704A.3)* **TABLE 1704A.3 1705A.2.1 REQUIRED VERIFICATION  
AND INSPECTION OF STEEL CONSTRUCTION**

<u>VERIFICATION AND INSPECTION</u>	<u>CONTINUOUS</u>	<u>PERIODIC</u>	<u>REFERENCED STANDARD<sup>a</sup></u>	<u>CBC REFERENCE</u>
<u>1. Material verification of high-strength bolts, nuts and washers:</u>				
<u>a. Identification markings to conform to ASTM standards specified in the approved construction documents.</u>	-	<u>X</u>	<u>AISC 360, Section A3.3 and applicable ASTM material standards</u>	-
<u>b. Manufacturer's certificate of compliance required.</u>	-	<u>X</u>	-	-
<u>2. Inspection of high-strength bolting:</u>				
<u>a. Snug-tight joints.</u>	-	<u>X</u>	<u>AISC 360, Section M2.5</u>	<u>1704A.3.3</u>
<u>b. Pretensioned and slip-critical joints using turn-of-nut with matchmarking, twist-off bolt or direct tension indicator methods of installation.</u>	-	<u>X</u>		
<u>c. Pretensioned and slip-critical joints using turn-of-nut without matchmarking or calibrated wrench methods of installation.</u>	<u>X</u>	-		
<u>3. Material verification of structural steel and cold-formed steel deck:</u>				
<u>a. For structural steel, identification markings to conform to AISC 360.</u>	-	<u>X</u>	<u>AISC 360, Section A3.1</u>	<u>2203A.1</u>
<u>b. For other steel, identification markings to conform to ASTM standards specified in the approved construction documents.</u>	-	<u>X</u>	<u>Applicable ASTM material standards</u>	
<u>c. Manufacturer's certified test reports.</u>	-	<u>X</u>		

<b>4. Material verification of weld filler materials:</b>				
<b>a. Identification markings to conform to AWS specification in the approved construction documents.</b>	-	X	AISC 360, Section A3.5 and applicable AWS A5 documents	-
<b>b. Manufacturer's certificate of compliance required.</b>	-	X	-	-
<b>5. Inspection of welding:</b>				
<b>a. Structural steel and cold-formed steel deck:</b>				
<b>1) Complete and partial joint penetration groove welds.</b>	X	-	AWS D1.1	1704A.3.1
<b>2) Multipass fillet welds.</b>	X	-		
<b>3) Single-pass fillet welds <math>&gt; \frac{5}{16}</math>"</b>	X	-		
<b>4) Plug and slot welds.</b>	X	-		
<b>5) Single-pass fillet welds <math>\leq \frac{5}{16}</math>"</b>	-	X	AWS D1.3	
<b>6) Floor and roof deck welds.</b>	-	X		

**TABLE 1704A.3 1704A.2.1- continued**  
**REQUIRED VERIFICATION AND INSPECTION OF STEEL CONSTRUCTION**

<u>VERIFICATION AND INSPECTION</u>	<u>CONTINUOUS</u>	<u>PERIODIC</u>	<u>REFERENCED STANDARD<sup>a</sup></u>	<u>CBC REFERENCE</u>
<u>b. Reinforcing steel:</u>				-
<u>1) Verification of weldability of reinforcing steel other than ASTM A 706.</u>	-	X	<u>AWS D1.4 ACI 318: Section 3.5.2</u>	
<u>2) Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special structural walls of concrete and shear reinforcement.</u>	X	-		
<u>3) Shear reinforcement.</u>	X	-		
<u>4) Other reinforcing steel.</u>	-	X		
<u>6. Inspection of steel frame joint details for compliance:</u>				
<u>a. Details such as bracing and stiffening.</u>	-	X	-	<u>1704A.3.2</u>
<u>b. Member locations.</u>	-	X		
<u>c. Application of joint details at each connection.</u>	-	X		

For SI: 1 inch = 25.4 mm.